Remarks:

The above amendments and these remarks are responsive to the Office action dated February 7, 2006.

Prior to entry of this Amendment, claims 1-3, 5-7, 9-11, 13, 26 and 27 were pending in the application. By this Amendment, claims 1, 5 and 26 have been amended. No claims have been added. None have been cancelled or withdrawn. Claims 1-3, 5-7, 9-11, 13, 26 and 27 thus all remain pending in the application.

In the Office action, the Examiner rejects claims 1-3, 5-7, 9-11, 13, 26 and 27 under 35 U.S.C. §102(b) based on newly-cited Kasanuki et al. (US 5,418,771). Applicants respectfully traverse the rejection, noting that Kasanuki et al. does not disclose dual spaced-plate capacitors having capacitances that continually vary throughout an operative range of relative motion between a first plate and second plates. Accordingly, Kasanuki et al. cannot define a position sensor configured so that its output is independent of perpendicular spacing variations occurring between the first plate and the second plates, as recited in applicants' claims.

In view of the amendments above, and the remarks below, applicants respectfully request reconsideration of the application under 37 C.F.R. § 1.111 and allowance of the pending claims.

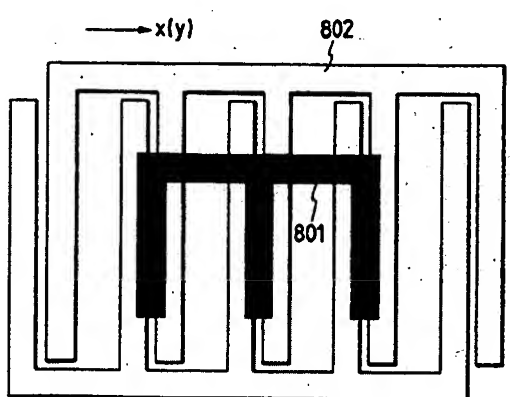
__Rejections under 35 USC § 102__

As noted above, claims 1-3, 5-7, 9-11, 13, 26 and 27 all stand rejected under 35 U.S.C. §102(b) based on Kasanuki et al. (US 5,418,771). In particular, the Examiner refers to the embodiment shown in Fig. 9 of Kasanuki et al. as showing a capacitance

based position sensor with a first plate (801) and a pair of second plates (802, 803). The Examiner further asserts that the configuration of the first plate and second plates is such that two spaced-plate capacitors have capacitances (C_4 and C_5) vary oppositely and continually as the as the first plate moves relative to the second plates. Applicants respectfully disagree with this interpretation of Kasanuki et al.

Upon careful reading, it will be noted that Kasanuki et al. discloses a surface aligning mechanism employing an upper electrode (801) that overlaps with lower electrodes (802 and 803) during <u>only portions of</u> the range of relative motion of the electrodes. As is apparent from Fig. 9 of Kasanuki et al. (reproduced below), the "ratio between the x(y)-directional width of an electrode piece, which is a tooth in the comb, and a clearance between two adjacent electrode pieces is not 1:1 but 1:2 to 1:3" (col. 11, lines 59-62).

FIG. 9

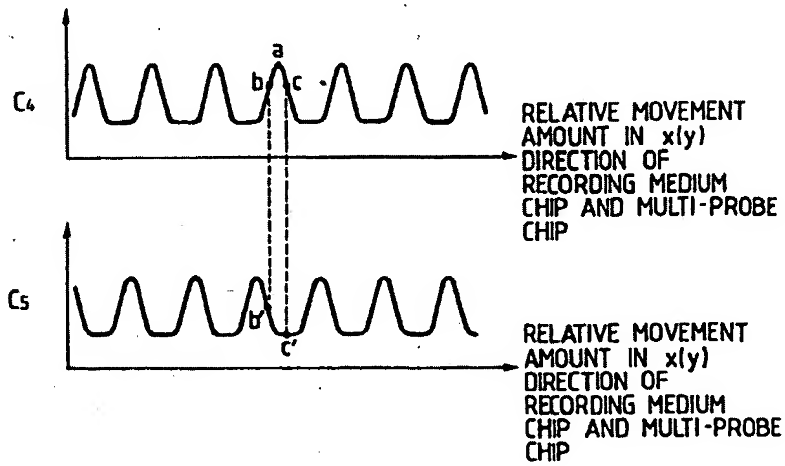


Accordingly, capacitances C_4 and C_5 do not <u>continually</u> vary as the plates move relative to one another. Rather, each capacitance varies only as the corresponding

lower electrode underlies the upper electrode. Therefore, as seen in Figs. 10A and 10B of Kasanuki et al. (reproduced below), capacitance remains constant for substantial portions of the range of motion (see the bottom portion of each capacitance signal).

FIG. 10A

FIG. 10B



Furthermore, as indicated by corresponding points (c and c') on the capacitance signals the capacitances do not vary <u>oppositely</u> throughout the operative range of relative motion between the electrodes. Rather, capacitance C_5 remains constant in the vicinity of point c' (Fig. 10B) as capacitance C_4 decreases in the corresponding vicinity of point c (Fig. 10A).

As noted by Kasanuki et al., in the foregoing arrangement, it is difficult, to accurately detect values from the capacitance signals (C_4 and C_5) due to the fact that the amplitude changes depending on the gap between the upper and lower electrodes in the z direction (col. 12, lines 28-33). Contrary to the Examiner's assertion (which actually refers to an entirely different embodiment with no indication as to how to integrate the two distinct embodiments), Kasanuki et al. does not address this shortcoming by providing a position sensor with an output that is independent of

perpendicular spacing variations occurring between the first plate and the second plates. Rather, Kasanuki et al. limits its operability to detection of a single point, free of any gap change in the z-direction (col. 12, lines 40-41). Kasanuki et al. looks only for a point "P" where a difference signal (C_4 - C_5) is at a zero-cross point, and the slope of signal is steep. This is practical because Kasanuki et al. is not a position sensor, but rather, is an apparatus for aligning a probe head substrate and a recording medium substrate. Sensing across an operative range of relative motion thus is not required by Kasanuki et al.

Focusing now on the pending claims, applicants note that amended claim 1 recites a movable system with a capacitance-based position sensor wherein "the configuration of the first plate and second plates results simultaneously in two spaced-plate capacitors having capacitances that vary oppositely as the objects move relative to one another throughout the operative range along the axis, where the capacitance-based position sensor uses the capacitances to generate output usable to determine relative position of the objects along the axis throughout the operative range along the axis." Claim 1 also recites that "the capacitance-based position sensor is configured so that the output is substantially independent of perpendicular spacing variations occurring between the first plate and the second plates."

As noted above, Kasanuki et al. does not disclose or suggest two spaced-plate capacitors having capacitances that vary oppositely as the objects move relative to one another throughout the operative range of relative motion between the plates, and does not disclose a capacitance-based position sensor that uses the capacitances to generate output usable to determine relative position of the objects along the axis throughout the operative range, as recited in claim 1. At best, Kasanuki et al. discloses detection of a zero-crossing of capacitance for the purpose of alignment.

Furthermore, Kasanuki et al. does not disclose or suggest a position sensor with an output that is substantially independent of perpendicular spacing variations occurring between the first plate and the second plates. Kasanuki et al. only discloses alignment at a point where there can be no gap change in the z-direction because the upper electrode does not overlie any lower electrode.

For at least the foregoing reasons, claim 1 is allowable over Kasanuki et al., and the rejection of claim 1 under 35 U.S.C. §102(b) based on Kasanuki et al. should be withdrawn. Claims 2, 3, 6 and 7 depend from claim 1, and thus are allowable for at least the same reasons as claim 1. The rejections of claims 2, 3, 6 and 7 thus also should be withdrawn.

Claim 5, as amended, recites a movable system with a capacitance-based position sensor wherein "the configuration of the first plate and second plates results simultaneously in two spaced-plate capacitors having capacitances that vary oppositely as the objects move relative to one another throughout the operative range along the axis, where the capacitance-based position sensor uses the capacitances to generate

output usable to determine relative position of the objects along the axis," and wherein "the capacitors form part of a capacitance measuring circuit having an output-input transfer function that is substantially independent of perpendicular spacing variations occurring between the first plate and each of the second plates as a result of the pair of objects moving relative to one another."

Kasanuki et al. does not disclose or suggest two spaced-plate capacitors having capacitances that vary <u>oppositely</u> as the objects move relative to one another <u>throughout</u> the operative range of relative motion between the plates. Moreover, Kasanuki et al. does not disclose or suggest a capacitance measuring circuit having an output-input transfer function that is substantially independent of perpendicular spacing variations occurring between the first plate and each of the second plates as a result of the pair of objects moving relative to one another." Kasanuki et al. only discloses alignment at a point where there can be no gap change in the z-direction because the upper electrode does not overlie any lower electrode.

Claim 5 thus is allowable over Kasanuki et al. for at least the foregoing reasons, and the rejection of claim 5 under 35 U.S.C. §102(b) based on Kasanuki et al. should be withdrawn.

Claim 9 recites a movable system with a capacitance-based position sensor wherein "the configuration of the first plate and second plates results simultaneously in two spaced-plate capacitors having capacitances that continually vary as the objects move relative to one another along the axis," and wherein "the sensor is configured so that the output is substantially independent of perpendicular spacing variations occurring between the first plate and the second plates."

Kasanuki et al. does not disclose or suggest two spaced-plate capacitors having capacitances that <u>continually</u> vary as the objects move relative to one another. Kasanuki et al. also does not disclose or suggest a sensor configured so that the output is substantially independent of perpendicular spacing variations occurring between the first plate and the second plates.

Claim 9 thus is allowable over Kasanuki et al. for at least the foregoing reasons, and the rejection of claim 9 under 35 U.S.C. §102(b) based on Kasanuki et al. should be withdrawn. Claims 10 and 11 depend from claim 9, and thus are allowable for at least the same reasons as claim 9. The rejections of claims 10 and 11 thus also should be withdrawn.

Claim 13 recites a movable system with a capacitance-based position sensor wherein "the configuration of the first plate and second plates results simultaneously in two spaced-plate capacitors having capacitances that vary continually as the objects move relative to one another along the axis," and wherein "the capacitors form part of a capacitance measuring circuit having an output-input transfer function that is substantially independent of perpendicular spacing variations occurring between the

first plate and the second plates as a result of the pair of objects moving relative to one another."

Kasanuki et al. does not disclose or suggest two spaced-plate capacitors having capacitances that continually vary as the objects move relative to one another. Kasanuki et al. also does not disclose or suggest a sensor configured so that the output is substantially independent of perpendicular spacing variations occurring between the first plate and the second plates.

Claim 13 thus is allowable over Kasanuki et al. for at least the foregoing reasons, and the rejection of claim 13 under 35 U.S.C. §102(b) based on Kasanuki et al. should be withdrawn.

Claim 26 recites a movable system with a capacitance-based position sensor wherein "the configuration of the first plate and second plates results simultaneously in two spaced-plate capacitors having capacitances that vary oppositely and continually as the objects move relative to one another throughout an entire operative range of relative motion between the first plate and the second plates within the plane, where the capacitance-based position sensor uses the capacitances to generate output usable to determine relative position of the objects within the plane," and wherein "the capacitance-based position sensor is configured so that the output is independent of perpendicular spacing variations occurring between the first plate and each of the second plates throughout the entire operative range of relative motion between the first plate and the second plates."

Kasanuki et al. does not disclose or suggest two spaced-plate capacitors having capacitances that vary oppositely and continually as the objects move relative to one another throughout an entire operative range of relative motion between the first plate and the second plates within the plane. Kasanuki et al. also does not disclose or suggest a sensor configured so that the output is substantially independent of perpendicular spacing variations occurring between the first plate and the second plates throughout the entire operative range of relative motion between the first plate and the second plates.

Claim 26 thus is allowable over Kasanuki et al. for at least the foregoing reasons, and the rejection of claim 26 under 35 U.S.C. §102(b) based on Kasanuki et al. should be withdrawn.

Claim 27 recites a movable system with a capacitance-based position sensor wherein "the configuration of the first plate and second plates results simultaneously in two spaced-plate capacitors having capacitances that vary continually as the objects move relative to one another within the operative range along the plural axes, where the capacitance-based position sensor uses the capacitances to generate output usable to determine relative position of the objects along the plural axes."

Kasanuki et al. does not disclose or suggest two spaced-plate capacitors having capacitances that vary continually as the objects move relative to one another. Claim 27 thus is allowable over Kasanuki et al. for at least the foregoing reasons, and the rejection of claim 27 under 35 U.S.C. §102(b) based on Kasanuki et al. should be withdrawn.

Conclusion

Applicants believe that this application is now in condition for allowance, in view of the above amendments and remarks. Accordingly, applicants respectfully request that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney of record.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on June 7, 2006.

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